

The claims defining the invention are as follows:

1. A waveguide directional filter arrangement comprising input waveguide means and an output waveguide means connected by cavity resonator means, wherein said input waveguide means and said output waveguide means each include broad wall sections joined by narrow wall sections whose aspect ratio is greater than 2:1.
2. A waveguide directional filter arrangement comprising an input waveguide means and an output waveguide means, wherein each said waveguide means includes an aperture means arranged to couple its associated waveguide means to a common resonator means, and wherein edges of each aperture means include inwardly extending sections.
3. A waveguide directional filter arrangement comprising an input waveguide means and an output waveguide means connected by cavity resonator means comprising at least three stacked resonator elements, wherein at least one pair of non-adjacent resonator elements include additional coupling means to couple the non-adjacent resonator elements.
4. A waveguide directional filter arrangement comprising input waveguide means and output waveguide means connected by cavity resonator means comprising at least one resonator element, said input waveguide means and said output waveguide means each include broad wall sections joined by narrow wall sections whose aspect ratio is greater than 2:1, each said waveguide means includes an aperture means arranged to couple its associated waveguide means to said cavity resonator means, wherein edges of each aperture means include inwardly extending sections.
5. A waveguide directional filter arrangement as claimed in claim 4, comprising at least 3 stacked resonator elements, at least one pair of non-adjacent resonator elements including additional coupling means to couple the non-adjacent resonator elements.
6. A waveguide directional filter arrangement as claimed in claim 5, wherein the additional coupling means comprises a first pair of coupling elements each of which

extend into a respective non-adjacent resonator element, said coupling elements being connected together by a first external transmission line means.

7. A waveguide directional filter arrangement as claimed in claim 6, including a second pair of coupling elements each of which extend into a respective non-adjacent resonator element, said coupling elements of said second pair of coupling elements being connected together by a second external transmission line means, said first pair of coupling elements and said second pair of coupling elements being disposed in a pre-determined spaced relationship.

8. A waveguide directional filter arrangement as claimed in claim 7, wherein said first pair of coupling elements and said second pair of coupling elements are disposed at approximately  $90^\circ$  to each other.

9. A waveguide directional filter arrangement as claimed in any one of claims 2, 4 to 8, wherein said inwardly extending sections are approximately hemicycle-shaped planar sections.

10. A waveguide directional filter arrangement as claimed in claim 9, wherein said hemicycle-shaped planar sections are integral with said aperture means.

11. A waveguide directional filter arrangement as claimed in claim 9, wherein said hemicycle-shaped planar sections are in the form of discrete members attached proximate said edges of said aperture means.

12. A waveguide directional filter arrangement as claimed in claims 2, 4 to 8, wherein said inwardly extending sections are hemicycle-shaped portions of cylinders, whose axes are normal to said aperture's major plane.

13. A waveguide directional filter arrangement as claimed in claim 12, wherein said cylinders are integral with said aperture means.

14. A waveguide directional filter arrangement as claimed in claim 12, wherein said cylinders are in the form of discrete members attached proximate said edges of said aperture means.

15. A waveguide directional filter arrangement as claimed in claim 11, wherein said discrete members include adjustment means for positional adjustment thereof.

16. A waveguide directional filter arrangement as claimed in claim 14, wherein said discrete cylinders include adjustment means for positional adjustment thereof.

17. A waveguide directional filter arrangement as claimed in any one of claims 4-16, wherein the aspect ratio of said wall sections is approximately 4:1.

18. A waveguide directional filter arrangement as claimed in any one of claims 3 to 17, wherein at least one said resonator element includes a plurality of cooling  
5 fins operatively attached thereto.

19. A waveguide directional filter arrangement as claimed in any one of claims 3 to 18, wherein at least one said resonator element includes at least one tuning  
10 element means.

20. A waveguide directional filter arrangement as claimed in any one of the preceding claims, wherein said resonator element is symmetric.

21. A waveguide directional filter arrangement, substantially as herein described with reference to Figures 1-4 of the accompanying drawings.

22. In a microwave filter comprising a housing within which is disposed at least two cavity resonators coupled by aperture means in a substantially planar wall common to both said resonators, an adjustable coupling aperture arrangement including aperture means comprising at least one slit of predetermined dimensions, the at least one slit communicating with a respective access hole in said housing via an associated passageway that lies within the boundary of said wall's major surfaces, wherein said at least one slit is provided with a moveable  
15 metal slug that is slideably retained by opposite longitudinal edges of the slit, whereby said slug can be engaged and slideably manipulated by a tool means, introduced into said access hole and guided to said slug via said passageway, into a position in which electrical contact between said slug and said edges of the slit produces a desired change in effective electrical length of the slit.

23. An adjustable aperture arrangement as claimed in claim 22, wherein said slug includes a screw operated locking means arranged to be actuated by said tool means for locking said slug in said position.

24. An adjustable aperture arrangement as claimed in claim 23, wherein said slug is a rectangular-shaped block having a groove in each of two opposite parallel  
20 sides for cooperating with opposite edges of said slit for slideably retaining and gripping said block therein, said block being formed from a first trapezoid-shaped section

and a second trapezoid-shaped section assembled together, with each section's non-parallel side interfacing, by a screw having a head and a threaded section, said screw's threaded section freely passing through a hole in the first trapezoid section to cooperate with a threaded hole provided in the second trapezoid-shaped section, whereby the width between said grooves can be varied by a turning adjustment of said screw with said tool means engaging the screw's head to change the positional relationship between the said interfacing non-parallel sides to cause the slug to be either slideably retained within the slit for manipulation, or fixedly locked in electrical contact with said edges of said slit.

25. An adjustable aperture arrangement as claimed in claim 24, wherein said aperture means comprises four slits of predetermined dimensions, extending outwardly from a central zone, each slit including a said slug, and each slit communicating with a respective said access hole via an associated said passageway.

26. An adjustable aperture arrangement as claimed in claim 25, wherein said planar wall is substantially circular in shape.

27. An adjustable aperture arrangement as claimed in any one of claims 24, 25 or 26, wherein the screw head includes a bayonet socket for cooperating with a tool having a T-shaped end.

28. An adjustable aperture arrangement substantially as herein described with reference to Figs. 5-11 of the accompanying drawings.

29. An adjustable aperture arrangement as claimed in any one of claims 22 to 28, operatively incorporated in a waveguide directional filter arrangement as claimed in any one of claims 1 to 21.

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